

CLAIMS

1. A nucleic acid amplifier comprising at least one flow channel therein, in which a reaction solution containing at least a nucleic acid to be used as a template, a nucleic acid to be used as a primer, a phosphate compound, and a metal ion is caused to flow through the flow channel to thereby perform the nucleic acid amplification in the flow channel, characterized in that the flow channel comprises:

a denaturation region in which a denaturation reaction is carried out, the denaturation reaction including melting an intramolecularly and/or intermolecularly formed double strand of the nucleic acid to be used as the template;

a regeneration region in which a double strand is formed with the nucleic acid to be used as the template after the double strand thereof is melted and the nucleic acid to be used as the primer; and

a nucleic acid synthetase immobilized in the regeneration region.

2. A nucleic acid amplifier according to claim 1, wherein a means for controlling temperature included by the nucleic acid amplifier is capable of heating the denaturation region and of keeping a temperature of the regeneration region lower than a temperature of the denaturation region.

3. A nucleic acid amplifier according to claim 1 or 2, wherein the nucleic acid synthetase is immobilized on beads, the beads fill at least the regeneration region.

4. A nucleic acid amplifier according to claim 1 or 2, wherein the nucleic acid synthetase is immobilized at least on an inner wall surface of the regeneration region.

5. A nucleic acid amplifier according to any one of claims 1 to 4, wherein the flow channel provides the denaturation region and the regeneration region alternately.

6. A nucleic acid amplifier according to any one of claims 1 to 5, wherein the nucleic acid synthetase has an optimum temperature of 30 to 40°C.

7. A nucleic acid amplifier according to any one of claims 1 to 6, wherein the flow channel provides a circulation flow channel, the circulation flow channel including the regeneration region and the denaturation region.

8. A nucleic acid amplifier according to any one of claims 1 to 7, further comprising a solution-sending device for directionally regulating a flow of the reaction solution, wherein the

solution-sending device is controllable to periodically reverse the direction of flow of the reaction solution.

9. A method of amplifying a nucleic acid, the nucleic acid being used as a template in a reaction solution containing at least the nucleic acid to be used as the template, a nucleic acid to be used as a primer, a phosphate compound, and a metal ion, comprising the steps of:

(a) denaturing the nucleic acid to be used as the template by melting an intramolecularly and/or intermolecularly formed double strand thereof at a predetermined region;

(b) regenerating a double strand by forming the double strand between the nucleic acid obtained in step (a) that to be used as the template wherein the double strand is melted and the nucleic acid to be used as the primer at a region different from the region of the step (a); and

(c) contacting the reaction solution during and/or just after the step (b) with a nucleic acid synthetase immobilized and retained in an active state at a region including the region on which the step (b) is performed.